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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,209	05/18/2001	Kozo Nakamura	82822	6736

7590

10/20/2003

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EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 10/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/856,209

Applicant(s)

NAKAMURA ET AL.

Examiner

Matthew J Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-10 and 14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-10 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/4/2003 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 7-10 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Iida et al (US 5,968,264).

In a method of manufacturing a crystal ingot, note entire reference, Iida teaches a silicon single crystal grown through the use of a crystal pulling apparatus, where wafers were sliced from the thus-obtained silicon ingot (col 14, ln 20-67). Iida also teaches $(\Delta G = G_e - G_c)$ is not greater than $5^\circ\text{C}/\text{cm}$, where G_e is a temperature gradient at the periphery and G_c is a temperature gradient at the center portion of a growing crystal (col 10, ln 5-15). Iida also teaches a

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$G_c=30^\circ\text{C}/\text{cm}$ ($3.0^\circ\text{C}/\text{mm}$) and a $G_e=35^\circ\text{C}/\text{cm}$ ($3.5^\circ\text{C}/\text{mm}$)(Fig 8), where the G_e/G_c ratio can be determined to be 1.16. Iida also discloses that wafers were sliced from the thus-obtained silicon ingot (col 14, ln 20-67) Iida also teaches an OSF region is observed between a N region, a neutral region having few defects, and a vacancy rich region and interstitial rich region (col 15, ln 1-15 and Fig 10A). Iida also teaches the G_c is the temperature gradient at a central portion of the growing crystal both in an in-crystal descending zone, $1300\text{-}1000^\circ\text{C}$, or in the vicinity of the solid-liquid interface of the crystal, melting point of silicon to 1400°C (col 4, ln 5-15 and col 4, ln 35-39), therefore G_c reads on applicant's $G1_{\text{center}}$ and $G2_{\text{center}}$. The value of $1.06 \times (G1_{\text{center}} \text{ and } G2_{\text{center}})^{-0.2}$ can be determined to be 0.68. Iida also teaches an OSF ring with an inner diameter of at least $\frac{1}{2}$ a wafer inner diameter (Fig 10A) at a pulling speed of $0.62 \text{ mm}/\text{min}$.

Referring to claim 7, Iida teaches a similar silicon ingot as applicant's ingot of claim 7, it is noted that claim 7 is a product by process relationship and it is the applicant's burden to show an unobvious difference. Iida et al teaches a silicon ingot pulled by a CZ method under conditions similar to applicant.

Referring to claim 8, Iida et al teaches a similar method of forming a silicon ingot, as applicant teaches in claim 7, therefore GOIC yield is inherent, absent evidence to the contrary.

Referring to claim 9, Iida et al teaches $G_c=30^\circ\text{C}/\text{cm}$ ($3.0^\circ\text{C}/\text{mm}$) and a $G_e=35^\circ\text{C}/\text{cm}$ ($3.5^\circ\text{C}/\text{mm}$)(Fig 8), where the G_e/G_c ratio can be determined to be 1.16 and a OSF ring occupying to crystal diameter ratio of greater than 0.5 and less than $1.06 \times (G1_{\text{center}} \times G2_{\text{center}})^{-0.2}$ in Fig 10A.

Referring to claim 10, Iida et al teaches a similar method of forming a silicon ingot, as applicant, therefore the GOIC mode yield is inherent, absent evidence to the contrary.

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Referring to claim 14, Iida et al teaches a density of void defects existing on the inside of an OSF ring reduced by expanding the inner diameter of the OSF ring in Fig 10A.

Response to Arguments

4. Applicant's arguments filed 8/4/2003 have been fully considered but they are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the values of paragraph 1 of claim 7 are values for generating a void defect zone) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant's argument that the void defect zone is inherent is noted but is not found persuasive. Applicant alleges that " $0.5 < (\text{OSF ring inner diameter/crystal diameter})$ " in claim 7 is intended for a wafer having a void defect zone. An inherent feature must still be claimed because although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore, it is unclear how the limitation of claim 7 inherently teaches a void defect zone because a void defect is different from a OSF ring, note page 1, last paragraph of the instant specification.

Applicant's argument that Iida does not teach an OSF ring diameter/crystal diameter between a value of 0.5 and 0.62 is noted but is not found persuasive. Iida teaches in Fig 10A, a longitudinally split silicon ingot pulled at different speeds, note Fig 10A, col 14, ln 50-55 and col

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7, In 56-63. In Fig 10A, an OSF ring 42 is shown with different diameter for various speed and the crystal diameter is depicted as the vertical lines. Based on the Figure, a silicon ingot with an OSF ring pulled at a rate of approximately 0.62 mm/min would result in an OSF ring diameter/crystal diameter within the claimed range.

Claim 7 is directed to a product and although claim 7 recites process limitations, the patentability determination of a product-by-process claim is based on the patentability of the product and does not depend on its method of production (MPEP 2113). Applicant has not successfully demonstrated any differences between the silicon ingot of the closest prior, the Iida reference, and the instantly claimed silicon ingot.

Applicant argument that the product is produced by the claimed process is substantially different from Iida is noted but is not found persuasive. This is viewed as mere attorney argument, which lacks evidence; therefore is not persuasive. Applicant has not provided evidence of any differences between the product taught by Iida and the instant product.

Applicant's argument that the Examiner cannot ignore any limitation in a claimed, which include the process steps is noted but is not found persuasive. The Examiner has addressed the process limitation previously, note the rejection based on the Iida patent. However, the Examiner further noted that the instant product claims include process limitation and the patentability determination of a product-by-process claim is based on the patentability of the product and does not depend on its method of production (MPEP 2113). Iida teaches the instantly claimed product, including the claimed process limitation. However, the process limitations are not given patentable weight. Also, the Examiner has not ignored the limitation; the limitation has been

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address by Iida and the Examiner address the process limitation by stating that the process limitations are not given patentable weight in the patentability determination of the product.

Conclusion

5. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS

NADINE G. NORTON
PRIMARY EXAMINER

